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US 4856339 A US 4581941 A
WPI ACC. NO. 85-073 234 & SU 1 109 624 A

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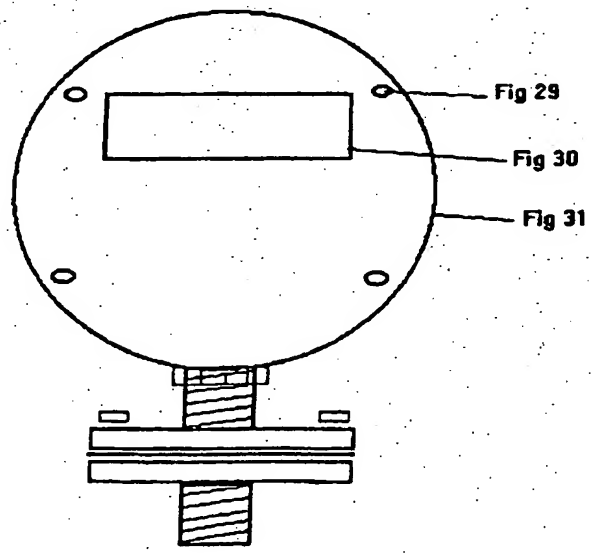
(71) Applicant(s)
Lawrence Delcassian
51 Greenhill Road, Timperley, ALTRINCHAM,
Cheshire, WA15 7BG, United Kingdom

(72) Inventor(s)
Lawrence Delcassian

(74) Agent and/or Address for Service
Lawrence Delcassian
51 Greenhill Road, Timperley, ALTRINCHAM,
Cheshire, WA15 7BG, United Kingdom

(54) Abstract Title
Hall effect pressure transducer comprising a diaphragm and a connection rod

(57) A pressure transducer unit to be attached to areas which are under pressure or in a vacuum. The unit measures using a galvanomagnetic medium. Through the movement of a rod (Fig 18) connected to a flexing diaphragm (Fig 24). Changes in pressure cause the diaphragm to distort. Movement of the rod is detected by changes in the magnetic field of a GaAs Hall chip mounted on the rod in position (Fig 19). Two magnets (Fig 15) provide a magnetic field which the rod and GaAs Hall chip pass through. There is no direct contact between the Hall chip and the magnets. Measurement is made though the linear relationship in the displacement of the Hall chip and the magnetic field. An LED display provides the information on magnetic linear movement created by diaphragm distortion. This information is displayed on the unit, or at a distance via electronic cable or radio transmission.



The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

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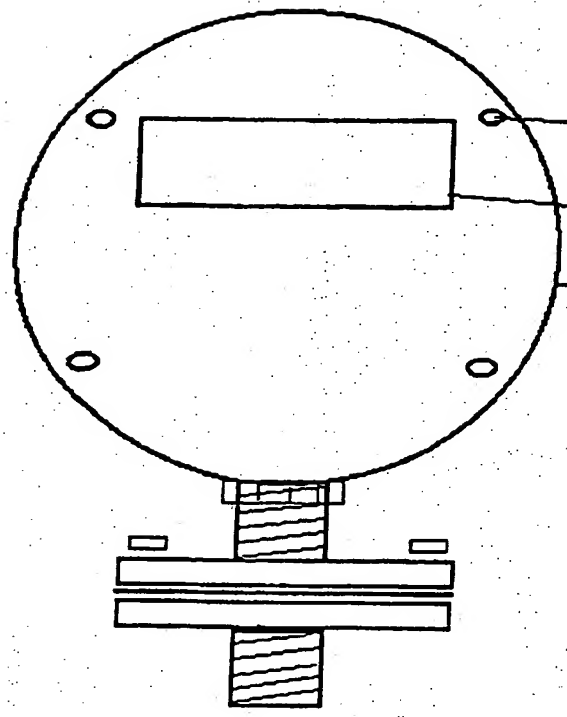

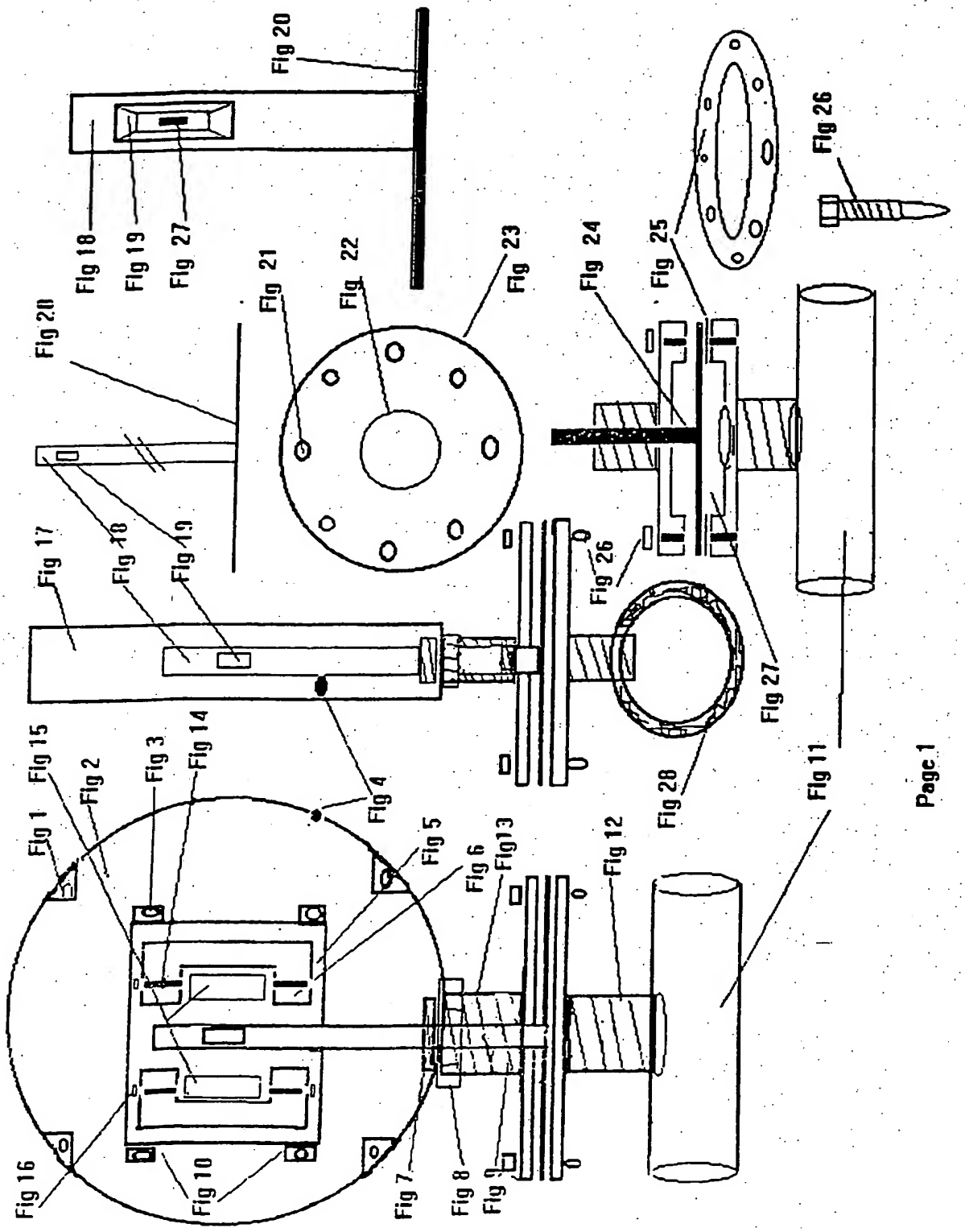

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PRESSURE TRANSDUCER USING THE HALL EFFECT

{Technical Field} This invention relates to an instrument to measure without direct contact the existence of both positive and negative pressure psi and in the medium of a vacuum Hg.

{Background} Pressure gauges have traditionally worked with the use of a Bourdon gauge, which straightens under pressure and moves a pointer round a scale. The pointer can also be activated through the use of a liquid under pressure. The pressure can be displayed on a LED unit connected to the measuring unit or at an external site.

{Essential Technical features} According to the present invention a method of measuring pressure using a galvanomagnetic unit, separated from the fluid or gas under pressure or in a vacuum by a diaphragm, the diaphragm is connected to a shaft which moves when the diaphragm is under pressure or in a vacuum, movements in the shaft are measured using a galvanomagnetic method, the shaft has a GaAs Hall chip positioned at its end, as this moves through the linear region of a magnetic field the change of the Hall voltage output is directly proportional to any movement in the shaft cased by movement in the pressure element, an air gap separates the magnetic units from the end of the shaft, magnetic interference is reduced by using none ferromagnetic material in areas of magnetic measurement, there is no direct contact between the pressure elements and the measurement element of the unit, the linear relationship between the displacement of the Hall chip and the magnetic field over the air gap is determined for different ranges of pressure elements, the display of pressure is on a LED unit ether connected to the housing of the invention or in a different location connected via an electronic cable, a radio transmission of the linear displacement is also envisaged.

{Example} A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which:-

Figure 1 shows the housing threaded holes for the front panel to line up to.

Figure 2 shows the casing outer body.

Figure 3 shows a fixing hole in the magnetic holding block.

Figure 4 indicates a rubberised sealing hole for cable access.

Figure 5 indicates the magnetic holding block.

Figure 6 shows the recessed area of the holding block.

Figure 7 shows the threaded tube between the diaphragm unit and the casing outer body as it enters the outer body.

Figure 8 shows guidence shank to outer casing body.

Figure 9 indicates the connecting tube between the diaphragm housing and the casing outer body.

Figure 10 shows fixing hole brackets connected to the magnetic holding block.

Figure 11 indicates location of pipe under enquiry.

Figure 12 shows location of connecting pipe between diaphragm and pipe under enquiry.

Figure 13 shows connection pipe threaded.

Figure 14 indicates a positioning screw hole.

Figure 15 shows a magnet.

Figure 16 shows the positioning screw.

Figure 17 shows a side view of the casing outer body.

Figure 18 indicates the moving rod connected to the diaphragm.

Figure 19 shows a recessed area in the rod into which the hall chip is positioned.

Figure 20 shows the diaphragm which flexes under pressure or in a vacuum.

Figure 21 indicates a securing hole in the top housing part of the diaphragm hosing unit.

Figure 22 shows the Fig 9 connection to the diaphragm housing.

Figure 23 shows a top down view of the diaphragm unit.

Figure 24 shows a side view of the rod and diaphragm connection.

Figure 25 indicates the position of the sealant ring.

Figure 26 shows the securing bolts for the diaphragm unit.

Figure 27 indicates the area below the diaphragm which would be under enquiry.

Figure 28 shows a side view of the pipe under enquiry and the intrusion into the pipe be Fig 12.

Figure 29 shows front panel aligning hole.

Figure 30 Indicates a LED display unit.

Figure 31 shows front panel.

CLAIMS

1. A pressure transducer unit to be attached to areas which are under pressure or in a vacuum. The unit measures using a galvanomagnetic medium, this is achieved through the movement of a rod connected to a diaphragm. The diaphragm distorts under applied pressure and also when subjected to a vacuum. These movements in the diaphragm are transferred along the rod. A GaAs hall chip is attached to the rod at the opposite end to the diaphragm. A magnetic field generated by two fixed magnets is present in the area of the GaAs hall chip. Measurement is made through the linear relationship in the displacement of the Hall chip and the magnetic field. An LED display indicates the displacement detected in the diaphragm. This LED display can be connected to the unit via electronic cable or be situated at a distance and connected by radio transmission.

2. A pressure transducer unit as claimed in Claim 1 where a diaphragm is connected to the unit and housed in a diaphragm housing.

3. A pressure transducer unit as claimed in Claim 1 or Claim 2 where the diaphragm is put under pressure or vacuum through a connecting pipe.

4. A pressure transducer unit as claimed in Claim 1 or 2 or 3 which can be calibrated for different pressure or vacuum requirements through the use of differing diaphragms.

5. A pressure transducer unit as claimed in Claim 1 or 2 or 3 or 4 where the GaAs hall chip and the magnets have no direct contact and measurement is achieved over an air gap.

6. A pressure transducer unit as claimed in any preceding claim which is made from none ferromagnetic material in areas of magnetic measurement.

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Claims searched: 1-6

Examiner: Eamonn Quirk
Date of search: 2 March 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

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Int Cl (Ed.7): G01D(5/14) G01L (9/00, 9/14)

Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB 2 256 050 A	(Burgoyne)	
A	GB 2 159 282 A	(NNC)	
Y	EP 0 250 133 A1	(Barry Wright Corporation)	1-3,5,6
A	US 4 856 339	(Centaur Sciences)	
A	US 4 581 941	(Controls Co.)	
Y	WPI Acc. No. 85-073 234 & SU 1 109 624 A (Maryisk Power Plant), 23 August 1984, see WPI abstract		1-3,5,6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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